

LIGHTING APPARATUS FOR A PORTABLE COMPUTER WITH ILLUMINATION APERTURES

FIELD OF THE INVENTION

The present invention relates generally to portable computers. More particularly, it pertains to an illumination device for a lap top computer.

BACKGROUND OF THE INVENTION

The use of lap top computers has increased dramatically as they have become more portable, and simultaneously more powerful. Computer users are now inclined to use their computers in places previously not possible before the prevalence of lap top computers. Lap top computers are now being utilized in places such as in automobiles, planes, at home in an easy chair, or in bed. These places are much more comfortable to a user or at least provide more flexibility for users to have access to a computer. However, the surrounding environment may not always provide a suitable work area, and often has insufficient lighting conditions. For screen illumination, lap top computers have been provided with a liquid crystal display with internal backlighting to illuminate the images created by the liquid crystal compound. The backlighting systems provide a viewable image on the computer screen, even in low levels of ambient light. The backlighting systems typically consist of a light source and a light pipe located next to and aligned parallel with the back surface of the liquid crystal display. The light source is conventionally a fluorescent tube attached to at least one edge surface of the light pipe. A reflective material may be wrapped around the light source to redirect light from the light source into the light pipe. The backlighting systems are limited to providing illumination to the liquid crystal display, and the keyboard and the surrounding work area remain poorly illuminated in conditions where only limited lighting is available.

Versatility of a lap top computer is currently limited because of the difficulty in viewing the keyboard in the dark, and computer users are operating lap top computers in locations where only limited light is available. Furthermore, lap top keys are small and located in close proximity to one another, increasing the need for a computer user to view the keys.

Accordingly, there is a need for a better way to provide lighting beyond the liquid crystal display for computer users which is integral to a lap top computer system, and can be implemented using current computer systems.

SUMMARY OF THE INVENTION

A lap top computer system is provided having a light emitting device for illuminating a keyboard, and the surrounding work area. The apparatus operates to convey light from the liquid crystal display backlighting to the keyboard and work area through lenses located on a surface of the computer body. The lenses are provided with adjustable doors for covering the light source to vary the level of illumination.

The lighting apparatus for a lap top computer comprises a light source, a liquid crystal display case encompassing a liquid crystal display, an illumination aperture, and a means for conveying light. In one embodiment, the light conveying means, a light pipe or an acrylic lens, optically communicates between the light source and the illumination aperture. The liquid crystal display case contains the illumination

apertures, each having a corresponding lens for transmitting light to the keyboard. The lens has a slightly convex shape for illuminating a field surrounding the lens, including the keyboard and a portion of the work area. In another embodiment, the lens is provided with a door member for limiting the amount of transmitted illumination.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating a computer system constructed in accordance with one embodiment of the present invention.

FIG. 2 is a cut-away perspective view of the computer system constructed in accordance with another embodiment of the present invention.

FIG. 3 is an enlarged cut-away perspective view of the computer system constructed in accordance with yet another embodiment of the present invention.

DESCRIPTION OF THE EMBODIMENTS

In the following detailed description, reference is made to the accompanying drawings which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention, and it is to be understood that other embodiments may be utilized and that structural changes may be made without departing from the spirit and scope of the present invention. Therefore, the following detailed description is not to be taken in a limiting sense, and the scope of the present invention is defined by the appended claims.

As shown in FIGS. 1-3, a lap top computer 10 has a display case 20 hingedly connected to a keyboard 18 and computer system. The display case 20 surrounds a liquid crystal display panel 22 covered by a transparent protective panel. Lenses 40 disposed within the display case 20 transmit illumination 80 from a conventional light source (not shown) to the keyboard 18 and surrounding work area. Referring to FIG. 2, the illumination 80 can be adjusted by a computer operator with door members 44 provided on the display case.

As illustrated particularly in FIG. 2, a conventional light source 26, such as a cold cathode fluorescent lamp, is provided at the back of the liquid crystal display panel 22. The light source 26 illuminates the liquid crystal display panel 22 from the rear side. A light distribution medium 24 is disposed at the back of the liquid crystal display panel 22 and abutting the light source 26. Each light distribution medium 24 is constructed to transmit light from a source and evenly distribute the light over the entire surface areas of the liquid crystal display panel 22.

One such light distribution medium 24 comprises a light pipe which communicates with a light source 26 and distribute the light over the surface area of a liquid crystal display panel 22. Various light pipe constructions are known and may be employed which have different diffusion, scattering, reflection, and distribution characteristics. Also suitable for use in the invention are constructions other than light pipes that transmit and evenly distribute light over a flat surface area and have a relatively thin cross-section such as conventional light curtains or diffusers.

In one embodiment of the lighting apparatus, a single light source 26 is disposed within the liquid crystal display case 20 adjacent to one edge of the panel. The light source 26 is intended to provide light to the distribution medium 24 for